Tiffany, Bruce

From: Cargill, Dan (ECY) [DACA461@ECY.WA.GOV]
Sent: Friday, March 23, 2007 11:50 AM
To: Jennie Goldberg; Tiffany, Bruce; Renaud, Rick; Flint.Kris@epamail.epa.gov; beth.schmoyer@seattle.gov
Subject: FW: NBF Soil Investigation Work Plan
Attachments: Soil Inves SAP.pdf

FYI
Dan
425-649-7023

From: Edens, Mark (ECY)
Sent: Friday, March 23, 2007 11:43 AM
To: Bach, Carl M
Cc: Cargill, Dan (ECY)
Subject: RE: NBF Soil Investigation Work Plan

Carl,

Dan, Iris Winstanley of SAIC, and I have the following comments on your work plan:

1. The plan indicates that soils will only be tested for PCBs. If there are visual or PID indications that soil is contaminated with petroleum hydrocarbons, these soils should also be tested for TPH.

2. Additional soil sampling is recommended near the southern limits of the drainage basin that contains building 3-353. As part of a cleanup near this building in 1990, there was sampling and testing of soil for TPH in the vicinity of an electrical transformer and an underground vault. Soils were not tested for PCBs. Sampling and testing in this area might help delineate the southern extent of PCB soil contamination in this area of the site.

3. Recent sediment trap data shows that there are continuing high levels of PCBs in manholes 363 and 422. If recent pipe inspections indicate there might be soil infiltration immediately upstream from these manholes, additional soil sampling and testing is needed at these locations.

4. SB-02 should be either be moved slightly to the north or an additional sampling location added to provide data from the former location of MW-1 as shown in AGI Technologies' 1998 report *Remedial Action Report, Proposed West Wing 3-333 Building Fuel Test Laboratory*. Residual PCB concentrations after cleanup at this location in 1998 were as high as 380 mg/kg at the bottom of the excavation.

I realize that these comments are coming quite near the time that field work is scheduled to begin, however it would be more efficient if this work could be done now rather than later.

On another issue, does Boeing staff want to meet with us prior to the end of the 30-day period following your receipt of the preliminary PLP notification letter (April 9)? If so, please let me know so that I can make arrangements for staff to attend.

Thanks.

Mark Edens
Ecology – TCP/NWRO
425-649-7070

From: Bach, Carl M [mailto:carl.m.bach@boeing.com]
Sent: Tuesday, March 20, 2007 11:34 AM
To: Cargill, Dan (ECY); Edens, Mark (ECY)
Cc: Kris Hendrickson; Power, Raymond T; Wallace, Fred J; Parsons, Jennifer A; McCormack, Daniel C
Subject: NBF Soil Investigation Work Plan

3/23/2007

Dan/Mark,

Attached is the work plan for conducting the subsurface PCB investigation at North Boeing Field. We have tentatively lined up a probe rig for March 28th. We anticipate that the sampling will take at least 5 days to complete. Locations specified in the work plan are approximate and will be adjusted in the field as necessary based on utility locating and other potential obstructions. If you have any questions, please call or email me.

Thanks,

Carl Bach
Environmental Remediation Project Manager
The Boeing Company
PO Box 3707, M/C 1W-12
Seattle WA 98124-2207

206-898-0438

3/23/2007

Sampling and Analysis Plan
Soil Investigation
North Boeing Field
Seattle, Washington

March 20, 2007

Prepared for

The Boeing Company
Seattle, WA

LANDAU ASSOCIATES
130 2nd Avenue South
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(425) 778-0907

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1.0 INTRODUCTION

This document presents a work plan for conducting a soil investigation at North Boeing Field (NBF) in Seattle, Washington (Figure 1). North Boeing Field is located east of East Marginal Way South adjacent to the King County Airport and City of Seattle Georgetown Steam Plant.

PCBs have been detected in soil in the northern portion of NBF. The purpose of this soil investigation is to evaluate the extent of polychlorinated biphenyls (PCBs) in soil. The investigation includes collecting soil samples, submitting the samples for laboratory analysis, evaluating the sample results, and preparing a report documenting the activities conducted and the findings.

2.0 SAMPLING AND ANALYSIS PLAN

This section presents the sampling and analysis procedures that will be implemented. Planned soil sampling locations are shown on Figure 2.

2.1 SOIL SAMPLE LOCATIONS AND DEPTHS

Soil samples will be collected from direct-push borings located in the northern portion of NBF. It is anticipated that soil samples will be collected from approximately 35 borings during 5 days of drilling. Borings will be drilled to a depth of about 6 ft below ground surface (BGS) using a truck-mounted Geoprobe™ direct-push rig. Areas targeted for sampling include those that may have been impacted by PCBs due to surface runoff from the Georgetown Steam Plant or activities conducted on the NBF property prior to Boeing's occupation of the property, and areas where storm drain system evaluations indicate soil may be entering the storm drain system. Proposed soil boring locations are shown on Figure 2. These locations, however, may be adjusted based on conditions encountered in the field at the time of drilling.

Prior to initiation of the soil sampling activities, Landau Associates' personnel will conduct a site reconnaissance with Boeing personnel to mark sampling locations, identify and mark the locations of above- and below-ground utilities, and discuss access issues. A one-call utility clearance request will be made to mark all public utilities within or near the site. A private utility locator will be contacted to check each boring location for the presence of utilities. The sampling locations will be adjusted, if necessary, based on access and utility considerations. To avoid damage to utilities, the driller will excavate to about 3 ft BGS by hand at each boring location that is within 24 inches of identified utilities before advancing the probes using the rig.

2.2 SOIL SAMPLE COLLECTION AND ANALYSIS

Soil samples will be collected continuously from just below the asphalt to a depth of about 6 ft BGS. The soil samples will be obtained from the borings using a closed-piston sampling device with a 48-inch long, 1.5-inch inside-diameter core sampler. The sampler will be advanced to the top of the sample interval with the piston in a locked position. The piston tip will then be loosened and the sampler will be advanced through the desired depth interval, thereby coring the soil inside the sampler's disposable, single-use liner. The sampler will then be withdrawn to retrieve the liner and soil sample. The liner will be cut to remove the soil sample. A new liner will be placed in the core sampler and this process will be repeated until all soil samples have been obtained. Between samples, the core sampler, including the piston tip and rods, will be decontaminated, as described in Section 2.5.

Soil samples will be field-screened using a photoionization detector (PID) and by visual inspection for indications of contamination. Two soil samples will be selected for laboratory analysis from each boring location. If there are no field indications of contamination, samples will be selected from 1 to 2 ft and 5 to 6 ft. If there are indications of contamination, one soil sample will be collected from the depth that appears to be most contaminated and an additional soil sample will be collected from the next deeper 1-ft interval. The soil sample representing the specified depth interval will be placed in a decontaminated stainless-steel bowl and homogenized using a stainless-steel spoon. Larger-sized material (gravel greater than about ¼-inch in diameter) will be removed by hand sorting. The sample will then be transferred to an 8 oz. wide-mouth glass jar and stored on ice in a cooler until delivered to the laboratory. The chain-of-custody accompanying the samples to the laboratory will be placed inside a separate plastic bag and taped inside the cooler lid. The cooler will be secured with signed custody seals and taped shut with strapping tape.

Samples will be transported to Analytical Resources, Inc., of Tukwila, Washington, Boeing's contracted analytical laboratory, at the end of each day of the sampling activities. The soil samples will be analyzed for PCB aroclors using U.S. Environmental Protection Agency (EPA) Method 8082.

2.3 SAMPLE DOCUMENTATION AND HANDLING

All samples will be assigned a unique identification code consisting of NBF (for North Boeing Field), followed by SB (for Soil Boring), followed by the date, followed by a location number, followed by the sample depth. For example, sample NBF-SB-032707-01(1-2) is a soil sample collected on March 27, 2007, from location 01 at the 1 to 2 ft depth interval.

A complete record of field activities will be maintained. Information from the field screening and a description in accordance with the unified soil classification system will be recorded on a Log of Exploration form. The Log of Exploration form will also be used to document the sample depth, sample collection method, sample recovery, any stratifications observed, groundwater conditions, and other pertinent information. If an error is made on a document, corrections will be made by drawing a single line through the error and entering the correct information. The erroneous information will not be obliterated. Corrections will be initialed and dated and, if necessary, a footnote explaining the correction will be added. Errors will be corrected by the person who made the entry, whenever possible.

2.4 BORING ABANDONMENT AND PAVEMENT PATCHING

Following soil sampling, the borings will be abandoned and pavement, if present, will be patched. The bore hole will be abandoned by backfilling with bentonite chips to within approximate4ly 1 ft of the

surface. In unpaved areas, the top few inches of the hole will be backfilled with native soil. Paved areas will be patched with redi-mix concrete.

2.5 EQUIPMENT DECONTAMINATION

The decontamination procedures described below are to be used by field personnel to clean drilling, sampling, and related field equipment. Deviation from these procedures must be documented in field records.

2.5.1 SAMPLING EQUIPMENT

All reusable sampling equipment (e.g., stainless-steel bowls, stainless-steel spoons, etc.) will be cleaned using a three-step process, as follows:

1. Scrub surfaces of equipment that would be in contact with the sample with brushes using an Alconox solution.
2. Rinse and scrub equipment with clean tap water.
3. Rinse equipment a final time with deionized water to remove tap water impurities.

Decontamination of the reusable sampling devices will occur between collection of each sample. Decontamination of sampling equipment that is suspected to have come into contact with free-phase liquid or that contains a visible sheen will include a hexane rinse (or other appropriate solvent) prior to the tap water rinse.

2.5.2 DRILLING RIG

The drilling rig and equipment that are used downhole, or that contact material and equipment going downhole, will be cleaned by a hot water, high-pressure wash before each use and at completion of the project.

2.6 RESIDUAL WASTE MANAGEMENT

Any residual soil generated will be placed in 55-gal drums or other approved container supplied by Boeing, labeled, and stored onsite for disposal by Boeing. Decontamination water generated during the investigation will be stored in 55-gal drums provided by Boeing. The drums will be properly labeled and stored onsite for disposal by Boeing.

3.0 QUALITY ASSURANCE PROJECT PLAN

The overall goal of the project QA program is to provide a reasonable degree of confidence in project data and results through establishment of a rigorous system of quality and performance checks on data collection, analysis, and reporting activities, as well as to provide for appropriate and timely corrective action to achieve compliance with established performance and quality criteria.

This section presents data quality objectives (DQO) and the QC procedures developed to meet these DQOs, field and laboratory quality control samples, corrective actions, and data quality evaluation.

3.1 DATA QUALITY OBJECTIVES

Results from the soil investigation will be used to evaluate the nature and extent of PCBs in soil from selected areas of NBF. The sample results must be precise, accurate, representative, complete, and comparable to a degree commensurate with this use.

The QA procedures presented are based on DQOs that were developed in accordance with guidance from EPA protocols (EPA 1986, 1999).

The control limits (the range within which project data of acceptable quality should fall) for data quality will be laboratory acceptance limits generated according to EPA guidelines, except for field duplicates. The control limits for field duplicate relative percent difference (RPD) will be 35 percent for soil and sediment samples. The control limits will be used to evaluate data acceptability and are considered to be QC goals for data acceptance.

Completeness for the project will be calculated as the proportion of data generated that is determined to be valid.

Comparability is an expression of the confidence with which one data set can be compared to another. Data generated will be reported in units consistent with EPA guidelines. Statistical tests used to determine data precision, accuracy, and completeness are presented in the following subsections. Statistical definitions for representativeness and comparability are also provided in the following subsections.

3.1.1 PRECISION

Precision is a measure of mutual agreement among individual measurements of the same property under prescribed conditions. Precision is best expressed in terms of the standard deviation or RPD. QA/QC sample types that test precision include field and laboratory duplicates and matrix or blank spike duplicates. The estimate of precision of duplicate measurements will be expressed as RPD, which is calculated:

$$RPD = \left| \frac{D_1 - D_2}{(D_1 + D_2)/2} \right| x\ 100$$

where: D_1 = first sample value

D_2 = second sample value (duplicate)

Current laboratory control limits will be used to evaluate RPDs for laboratory duplicates and matrix spike duplicates. For field duplicates, RPD control limits of 35 percent will be used for soil and sediment samples.

3.1.2 ACCURACY

Accuracy is the degree of agreement of a measurement (or an average of measurements of the same property; X), with an accepted reference or true value (T), usually expressed as the difference between the two values (X-T), the difference as a percentage of the reference or true value (100 (X-T)/T), or as a ratio (X/T). Accuracy is a measure of the bias in a system and is expressed as the percent recovery of spiked (surrogate spike) samples:

$$Percent\ Recovery = \frac{(Spiked\ Sample\ Result - Unspiked\ Sample\ Result)}{Amount\ of\ Spike\ Added} x\ 100$$

Current laboratory control limits will be used to evaluate spike recoveries.

3.1.3 REPRESENTATIVENESS

Representativeness expresses the degree to which data accurately and precisely represent an actual condition or characteristic of a population. Representativeness can be evaluated using replicate samples, additional sampling locations, and blanks. Representativeness for this project will be evaluated using field duplicates and analysis of method blanks to verify that the analytical results are representative of the sampled item and not influenced by cross-contamination.

3.1.4 COMPLETENESS

Completeness is a measure of the proportion of data obtained from a task-sampling plan that is determined to be valid. It is calculated as the number of valid data points divided by the total number of data points collected. The QA objective for completeness during this project will be 95 percent. Completeness will be routinely determined and compared to the DQO acceptable percentage.

3.1.5 COMPARABILITY

Comparability is an expression of the confidence with which one data set can be compared to another. QA procedures in this document will provide for measurements that are consistent and representative of the media and conditions measured. All sampling procedures and analytical methods used for the investigation activities will be consistent to provide comparability of results for samples and split samples. Data collected under this plan also will be calculated, qualified, and reported in units consistent with EPA guidelines.

3.2 LABORATORY QUALITY CONTROL SAMPLES

Laboratory control samples will be used to evaluate data precision, accuracy, representativeness, completeness, and comparability of the analytical results. A summary of the QC samples is presented in the following subsections.

3.2.1 LABORATORY METHOD BLANKS

A minimum of one laboratory method blank per 20 samples, one every 12 hours, or one per batch of samples analyzed (if fewer than 20 samples are analyzed) will be analyzed for all parameters to assess possible laboratory contamination. Dilution water will be used whenever possible. Method blanks will contain all reagents used for analysis. The generation and analysis of additional method, reagent, and glassware blanks may be necessary to verify that laboratory procedures do not contaminate samples.

3.2.2 LABORATORY CONTROL SAMPLE

A minimum of one laboratory control sample per 20 samples, not including QC samples, or one laboratory control sample per sample batch if fewer than 20 samples are obtained, will be analyzed for all parameters. These analyses will be performed to provide information on accuracy. The laboratory spikes will follow EPA guidance for blank spikes.

3.2.3 SURROGATE SPIKES

All project samples analyzed for PCBs will be spiked with appropriate surrogate compounds as defined by the analytical methods. These analyses will be performed to provide information on accuracy and to verify that extraction and concentration levels are acceptable. The laboratory spikes will follow EPA guidance for surrogate spikes.

3.3 DATA QUALITY EVALUATION

An internal data quality evaluation will be performed on all sample data collected as part of the soil and sediment investigation to determine acceptability of data results. Data quality evaluation will be performed in accordance with the appropriate sections of the EPA Contract Laboratory Program *National Functional Guidelines for Organic Data Review* (EPA 1999) and will include evaluations of the following:

- Chain-of-custody records
- Holding times
- Laboratory method blanks
- Surrogate recoveries
- Blank spikes/laboratory control samples
- Laboratory duplicates
- Field duplicates
- Corrective action records
- Completeness
- Overall assessment of data quality.

In the event that a portion of the data is outside the DQO limits or the EPA guidance (EPA 1999), or sample collection and/or documentation practices are deficient, corrective action(s) will be initiated. Corrective action will be determined by the field coordinator and Landau Associates' QA officer in consultation with the Landau Associates' project/task manager and may include any of the following:

- Rejection of the data and resampling
- Qualification of the data
- Modified field and/or laboratory procedures.

Data qualification arising from data quality evaluation will be described in the data quality evaluation report, rather than in individual corrective action reports.

6.0 SCHEDULE

Soil sampling will occur after Boeing approval of this work plan. It is currently anticipated that field activities will commence in late March 2007. Soil sampling will require approximately 5 days. It is anticipated that laboratory analysis results will be available about 2 weeks after sample collection. A draft report describing the results will be provided to Boeing about 3 weeks after receipt of the final laboratory data.

* * * * * * *

This document has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.

Kristy J. Hendrickson, P.E.
Principal

KJH/tam

5.0 DATA EVALUATION AND REPORTING

Following receipt of the analytical results for the soil samples, Landau Associates will validate the laboratory data. The results of the soil investigation, including a description of field activities, laboratory data, summary tables of the testing results, and one or more sample location figures will be presented in a report.

6.0 SCHEDULE

Soil sampling will occur after Boeing approval of this work plan. It is currently anticipated that field activities will commence in late March 2007. Soil sampling will require approximately 5 days. It is anticipated that laboratory analysis results will be available about 2 weeks after sample collection. A draft report describing the results will be provided to Boeing about 3 weeks after receipt of the final laboratory data.

* * * * * * *

This document has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.

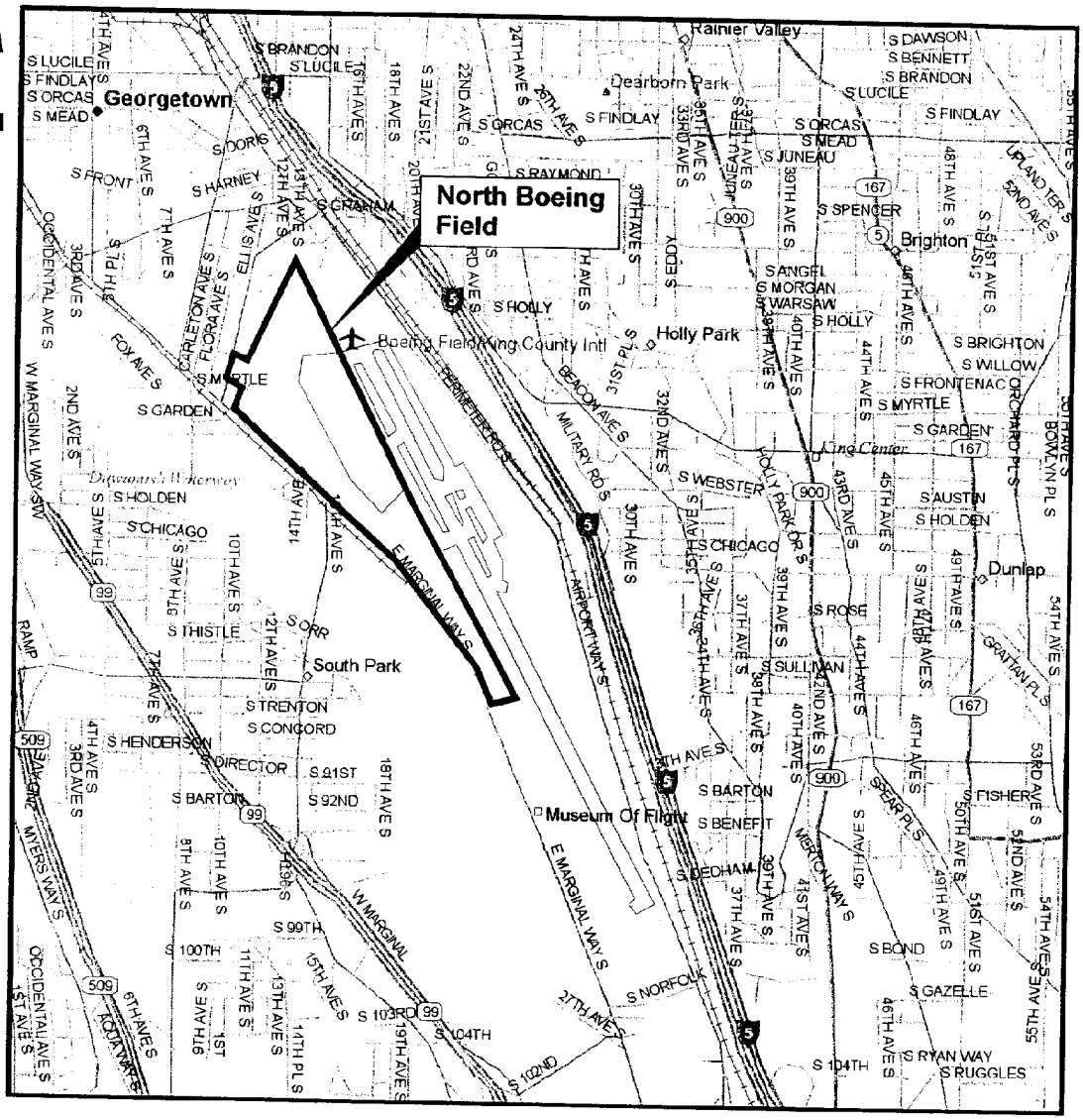
Kristy J. Hendrickson, P.E.
Principal

KJH/tam

7.0 REFERENCES

EPA. 1999. *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*. Office of Solid Waste and Emergency Response, Publication 9240.1-05A-P, EPA-540-R-99/008. October.

EPA. 1986. *Test Procedures for Solid Waste*. Third Edition, SW-846. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC.



Map from DeLorme Street Atlas USA, 2002

North Boeing Field/Joint Material/Tech Memo Dec 2005/ V:\025\082\095\091\Geoprobe Soil Sampling SAP\Fig1.cdr 3/16/2007

LANDAU ASSOCIATES

North Boeing Field Seattle, Washington	**Vicinity Map**	Figure 1

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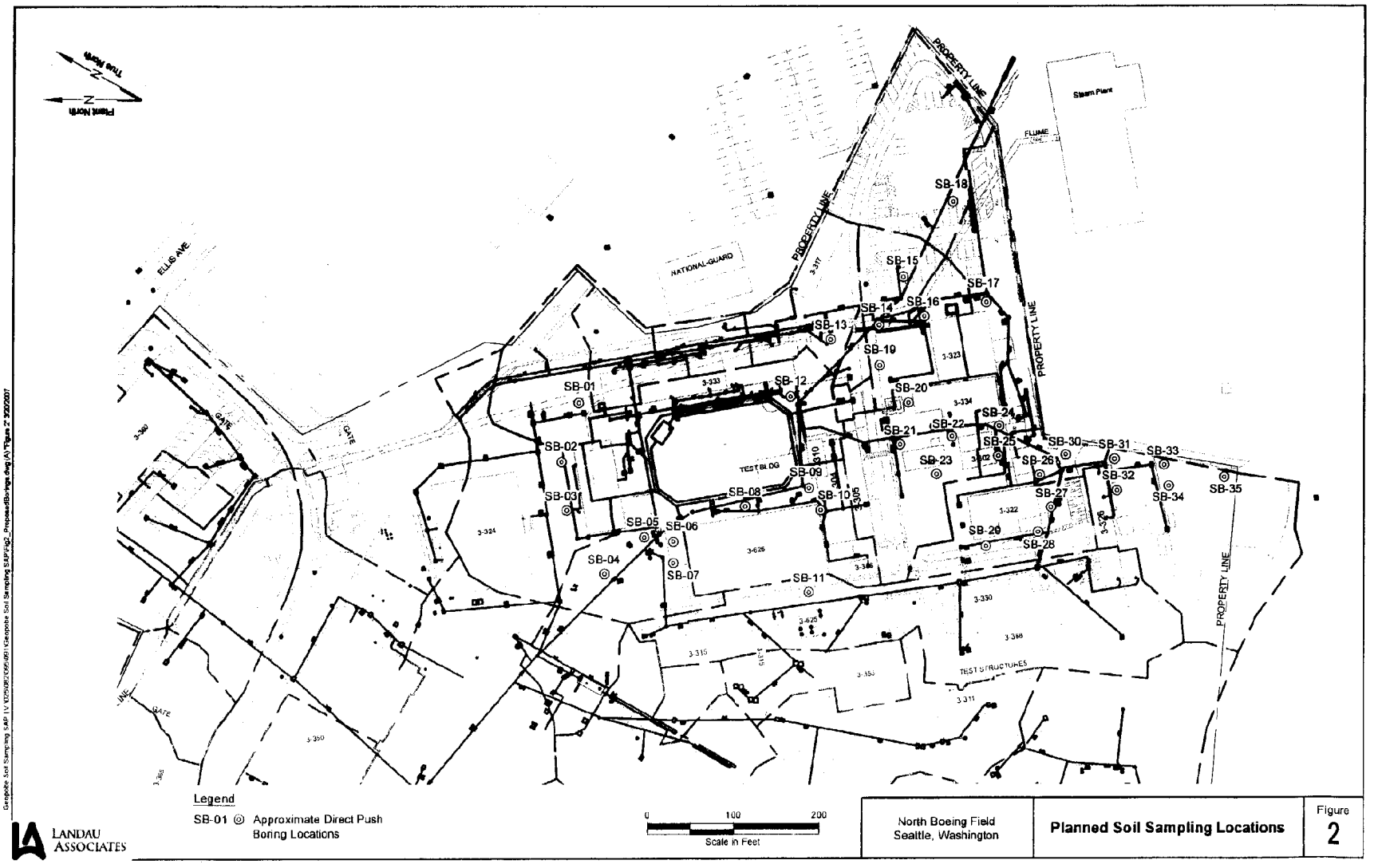

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APPENDIX A

Health and Safety Plan